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IN THE CLAIMS:

1. (Previously Presented) A method executed in a computer apparatus for creating a model of a combined physical system having physical quantities by representing physical quantities of the combined physical system in terms of ~~producing~~ a combined set of partial differential equations, the method comprising:

representing at least one of a plurality of systems as two or more selected application modes modeling physical quantities of said one of said plurality of systems;

determining a set of partial differential equations for each of the two or more selected application modes, parameters of the partial differential equations being physical quantities of corresponding ones to said one of said plurality of systems;

forming said combined set of partial differential equations using the determined sets of partial differential equations associated with said one of said plurality of systems; and

outputting a model of said combined physical system based on said combined set of partial differential equations for the two or more selected application modes for the said one of said plurality of systems, whereby the model represents a mathematical expression of the physical quantities of the combined physical system.

2. (Canceled).

3. (Previously Presented) The method of Claim 1, further comprising:

representing at least one of said physical quantities of a first of said plurality of application modes using at least one dependent variable in said set of partial differential equations corresponding to said first of said plurality of application modes.

4. (Original) The method of Claim 3, further comprising:

representing said at least one of said physical quantities directly as said at least one dependent variable.

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5. (Original) The method of Claim 4, further comprising:  
representing said at least one of said physical quantities using a  
relation between said at least one dependent variable and another variable representing said at  
least one physical quantity.

6. (Original) The method of Claim 5, wherein said at least one of said  
physical quantities is represented using at least one of: a numerical value and a mathematical  
expression.

7. (Original) The method of Claim 6, further comprising:  
forming said mathematical expression including at least one of: a space  
coordinate, a time coordinate, a numerical value, and an actual physical quantity.

8. (Original) The method of Claim 1, further comprising:  
associating at least one subdomain with each application mode.

9. (Original) The method of Claim 8, wherein each of said physical quantity  
is described by at least one physical property, and the method further comprising:  
disabling at least one physical quantity and associated variables in a  
subdomain.

10. (Previously Presented) The method of Claim 1, further comprising:  
displaying a partial differential equation in one of a: coefficient view  
and a general form corresponding to a representation of said partial differential equation; and  
modifying a portion of said partial differential equation.

11. (Original) The method of Claim 10, further comprising: modifying at  
least one boundary condition of said partial differential equation.

12. (Original) The method of Claim 10, further comprising:  
modifying at least one coefficient of said partial differential equation.

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13. (Previously Presented) The method of Claim 10, further comprising:  
obtaining data using a graphical user interface in connection with said  
one of said plurality of systems.

14. (Original) The method of Claim 10, further comprising:  
using a graphical user interface to display and input data.

15. (Previously Presented) The method of Claim 1, further comprising:  
solving said combined system of partial differential equations using a  
coefficient form of said combined set of partial differential equations.

16. (Previously Presented) The method of Claim 1, further comprising:  
solving said combined set of partial differential equations using a  
general form of said combined system of partial differential equations.

17. (Previously Presented) The method of Claim 16, further comprising:  
converting at least one set of partial differential equations included in  
said combined set of partial differential equations from coefficient to general form.

18. (Previously Presented) The method of Claim 17, further comprising:  
converting said combined set of partial differential equations from  
coefficient to general form.

19. (Previously Presented) The method of Claim 18, further comprising:  
using linearization of a general form to solve for a non-linear set of  
partial differential equations.

20. (Previously Presented) The method of Claim 19, further comprising:  
using a Newton method in solving for said non-linear set of partial  
differential equations.

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21. (Previously Presented) The method of Claim 1, further comprising:  
solving said combined set of partial differential equations.

22. (Previously Presented) The method of Claim 21, wherein solving said combined set further includes:  
selecting a portion of physical quantities in said combined set of partial differential equations;  
solving for one or more variables associated with said portion of physical quantities.

23. (Original) The method of Claim 22, further comprising:  
using values associated with physical quantities not included in said portion for specifying initial conditions.

24. (Previously Presented) The method of Claim 21, further comprising:  
selecting a solver type specifying a particular technique used in solving said combined set of partial differential equations.

25. (Original) The method of Claim 24, wherein said solver type uses a finite element method.

26. (Previously Presented) The method of Claim 1, further comprising:  
using a graphical user interface in connection with input data;  
storing said input data in a representation in a data structure stored in a memory of the computer system; and  
converting said input data into an intermediate form wherein said intermediate form for each set of partial differential equations associated with said one of said plurality of systems is used in forming said combined set.

27. (Previously Presented) The method of Claim 1, further comprising:

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determining a submode setting associated with one of the sets of partial differential equations associated with said one of said plurality of systems; and  
determining a number of variables included in said one set of partial differential equations in accordance with said submode setting and a type of a corresponding application mode.

28. (Original) The method of Claim 27, wherein said submode is one of stationary, time dependent, linear, non-linear, scalar and multi-component.

29. (Original) The method of Claim 1, further comprising:  
selecting at least one application mode.

30. (Original) The method of Claim 29, wherein said at least one application mode is one of predefined and user defined.

31. (Original) The method of Claim 30, further comprising:  
modifying a set of routines associated with a predefined application mode to be used in connection with a user defined application mode.

32. (Previously Presented) The method of Claim 1, wherein said one of said plurality systems being modeled is a one-dimensional geometry model.

33. (Previously Presented) The method of Claim 1, wherein said one of said plurality systems being modeled is a two-dimensional geometry model.

34. (Previously Presented) The method of Claim 1, wherein said one of said plurality of systems being modeled is a three-dimensional geometry model.

35. (Original) The method of Claim 31, further comprising:  
defining a user-defined application mode.

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36. (Original) The method of Claim 35, wherein said defining a user-defined application mode further comprises:

defining an object class corresponding to said user-defined application mode; and

defining a first portion of methods included in said object class using functionality that is inherited from other classes.

37. (Original) The method of Claim 36, further comprising:

overloading a second portion of methods to provide alternative functionality.

38. (Original) The method of Claim 37, further comprising:

using overloading in connection with at least one method to disable functionality of said at least one method.

39. (Original) The method of Claim 31, further comprising:

defining an application that is a subclass of an existing class corresponding to functionality of an application mode.

40. (Original) The method of Claim 39, wherein said application mode is user-defined.

41. (Original) The method of Claim 39, wherein said application mode is predefined.

42. (Currently Amended) A computer readable medium having stored thereon instructions for creating a model of a combined physical system having physical quantities by representing physical quantities of the combined physical system in terms of producing a combined set of partial differential equations comprising machine executable code which when executed by at least one processor, causes the processor to perform steps comprising:

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representing at least one of a plurality of systems as two or more selected application modes modeling physical quantities of said one of said plurality of systems;

determining a set of partial differential equations for each of the two or more selected application modes, parameters of the partial differential equations being physical quantities of corresponding ~~ones~~ ~~to said one of~~ said plurality of systems;

forming said combined set of partial differential equations using sets of partial differential equations associated with said one of said plurality of systems; and

outputting a model of said combined physical system based on said combined set of partial differential equations for the two or more selected application modes for the said one of said plurality of systems, whereby the model represents a mathematical expression of the physical quantities of the combined physical system.

43. (Previously Presented) The computer readable medium of Claim 42, further comprising:

representing at least one of said physical quantities of a first of said plurality of application modes using at least one dependent variable in said set of partial differential equations corresponding to said first of said application modes.

44. (Previously Presented) The computer readable medium of Claim 43, further comprising:

representing said at least one of said physical quantities directly as said at least one dependent variable.

45. (Previously Presented) The computer readable medium of Claim 44, further comprising:

representing said at least one of said physical quantities using a relation between said at least one dependent variable and another variable representing said at least one physical quantity.

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46. (Previously Presented) The computer readable medium of Claim 45, wherein said at least one of said physical quantities is represented using at least one of: a numerical value and a mathematical expression.

47. (Previously Presented) The computer readable medium of Claim 46, further comprising:

forming said mathematical expression including at least one of: a space coordinate, a time coordinate, a numerical value, and an actual physical quantity.

48. (Previously Presented) The computer readable medium of Claim 42, further comprising:

associating at least one subdomain with each application mode.

49. (Previously Presented) The computer readable medium of Claim 48, wherein each of said physical quantity is described by at least one physical property, and the computer readable medium further comprises:

disabling at least one physical quantity and associated variables for a portion of a subdomain.

50. (Previously Presented) The computer readable medium of Claim 42, further comprising:

displaying a partial differential equation in one of a: coefficient view and a general form corresponding to a representation of said partial differential equation; and modifying a portion of said partial differential equation.

51. (Previously Presented) The computer readable medium of Claim 50, further comprising:

modifying at least one boundary condition of said partial differential equation.

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52. (Previously Presented) The computer readable medium of Claim 50,  
further comprising:  
modifying at least one coefficient of said partial differential equation.

53. (Previously Presented) The computer readable medium of Claim 50,  
further comprising:  
obtaining data using a graphical user interface in connection with said  
one of said plurality of systems.

54. (Previously Presented) The computer readable medium of Claim 50,  
further comprising:  
using a graphical user interface to display and input data.

55. (Previously Presented) The computer readable medium of Claim 42,  
further comprising:  
solving said combined set of partial differential equations using a  
coefficient form of said combined set of partial differential equations.

56. (Previously Presented) The computer readable medium of Claim 42,  
further comprising:  
solving said combined set of partial differential equations using a  
general form of said combined set of partial differential equations.

57. (Previously Presented) The computer readable medium of Claim 56,  
further comprising:  
converting at least one set of partial differential equations included in  
said combined set of partial differential equations from coefficient to general form.

58. (Previously Presented) The computer readable medium of Claim 57,  
further comprising:

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converting said combined set of partial differential equations from coefficient to general form.

59. (Previously Presented) The computer readable medium of Claim 58, further comprising:

using linearization of a general form to solve for a non-linear system of partial differential equations.

60. (Previously Presented) The computer readable medium of Claim 59, further comprising:

using a Newton method in solving for said non-linear system of partial differential equations.

61. (Previously Presented) The computer readable medium of Claim 42, further comprising:

solving said combined set of partial differential equations.

62. (Previously Presented) The computer readable medium of Claim 61, wherein said solving said combined set further includes:

selecting a portion of physical quantities in said combined system set of partial differential equations; and

solving for one or more variables associated with said portion of variables.

63. (Previously Presented) The computer readable medium of Claim 62, further comprising:

using values associated with physical quantities not included in said portion for specifying initial conditions.

64. (Previously Presented) The computer readable medium of Claim 61, further comprising:

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selecting a solver type specifying a particular technique used in solving said combined set of partial differential equations.

65. (Previously Presented) The computer readable medium of Claim 64, wherein said solver type includes solving a system of partial differential equations using a finite element method.

66. (Previously Presented) The computer readable medium of Claim 42, further comprising:

- using a graphical user interface in connection with input data;
- storing said input data in a representation in a data structure stored in a memory of the computer system; and
- converting said input data into an intermediate form wherein said intermediate form for each set of partial differential equations associated with said one of said plurality of systems is used in forming said combined set.

67. (Previously Presented) The computer readable medium of Claim 42, further comprising:

- determining a submode setting associated with one of the sets of partial differential equations associated with said one of said plurality of systems; and
- determining a number of variables included in said one set of partial differential equations in accordance with said submode setting and a type of a corresponding application mode.

68. (Previously Presented) The computer readable medium of Claim 67, wherein said submode is one of stationary, time dependent, linear, non-linear, scalar and multi-component.

69. (Previously Presented) The computer readable medium of Claim 42, further comprising:

- selecting at least one application mode.

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70. (Previously Presented) The computer readable medium of Claim 69, wherein said at least one application mode is one of predefined and user defined.

71. (Previously Presented) The computer readable medium of Claim 70, further comprising:

defining a user defined application mode; and  
modifying a set of routines associated with a predefined application mode to be used in connection with a user defined application mode.

72. (Previously Presented) The computer readable medium of Claim 42, wherein said one of said plurality systems being modeled is a one-dimensional geometry model.

73. (Previously Presented) The computer readable medium of Claim 42, wherein said one of said plurality systems being modeled is a two-dimensional geometry model.

74. (Previously Presented) The computer readable medium of Claim 42, wherein said one of said plurality of systems being modeled is a three-dimensional geometry model.

75. (Previously Presented) The computer readable medium of Claim 42, further comprising:

defining a user-defined application mode.

76. (Previously Presented) The computer readable medium of Claim 75, wherein said machine executable code for defining a user-defined application mode further comprises:

defining an object class corresponding to said user-defined application mode; and

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defining a first portion of methods included in said object class using functionality that is inherited from other classes.

77. (Previously Presented) The computer readable medium of Claim 76, further comprising:

overloading a second portion of methods to provide alternative functionality.

78. (Previously Presented) The computer readable medium of Claim 77, further comprising:

using overloading in connection with at least one method to disable functionality of said at least one method.

79. (Previously Presented) The computer readable medium of Claim 42, further comprising:

defining an application that is a subclass of an existing class corresponding to functionality of an application mode.

80. (Previously Presented) The computer readable medium of Claim 79, wherein said application mode is user-defined.

81. (Previously Presented) The computer readable medium of Claim 79, wherein said application mode is predefined.

82. (Previously Presented) A method executed in a computer apparatus for creating a model of a combined physical system having physical quantities by representing physical quantities of the combined physical system in terms of solving a set of partial differential equations comprising:

defining a plurality of user-defined application modes modeling physical quantities of an associated model;

selecting two or more of the user-defined application modes;

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determining sets of partial differential equations for said selected two or more user-defined application modes of said associated model, parameters of the partial differential equations being physical quantities of an associated model; and

outputting a model based on a combination of the determined sets of partial differential equations for the two or more selected user-defined application modes for the associated model, whereby the model represents physical quantities of the combined physical system.

83. (Previously Presented) The method of Claim 82, further comprising:  
solving for said set of partial differential equation using a finite element method.

84. (Original) The method of Claim 82, wherein said user-defined application mode is one of: a one-dimensional model, a two-dimensional model and a three-dimensional model.

85. (Original) The method of Claim 84, wherein said defining a user-defined application mode further comprises:

defining an object class corresponding to said user-defined application mode; and

defining a first portion of methods included in said object class using functionality that is inherited from other classes.

86. (Original) The method of Claim 85, further comprising:  
overloading a second portion of methods to provide alternative functionality.

87. (Original) The method of Claim 86, further comprising:  
using overloading in connection with at least one method to disable functionality of said at least one method.

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88. (Canceled).

89. (Original) The method of Claim 82, further comprising:  
defining at least one user-defined application that is a subclass of an  
existing class associated with an application mode.

90. (Original) The method of Claim 89, wherein said application mode  
associated with said existing class is user-defined.

91. (Original) The method of Claim 89, wherein said application mode  
associated with said existing class is predefined.

92. (Currently Amended) A computer readable medium having stored  
thereon instructions for creating a model of a combined physical system having physical  
quantities by representing physical quantities of the combined physical system in terms of  
solving a system of partial differential equations comprising machine executable code which  
when executed by at least one processor, causes the processor to perform steps comprising:  
defining a plurality of user-defined application modes modeling  
physical quantities of an associated model;  
selecting two or more of the user-defined application modes;  
determining sets of partial differential equations for said selected two  
or more user-defined application modes of said associated model, parameters of the partial  
differential equations being physical quantities of corresponding systems; and  
outputting a model based on a combination of the determined sets of  
partial differential equations for the two or more selected user-defined application modes for  
the associated model, whereby the model represents a mathematical expression of the  
physical quantities of the combined physical system.

93. (Previously Presented) The computer readable medium of Claim 92,  
further comprising:

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solving for said set of partial differential equations using a finite element method.

94. (Previously Presented) The computer readable medium of Claim 92, wherein said user-defined application mode is one of: a one-dimensional model, a two-dimensional model and a three-dimensional model.

95. (Previously Presented) The computer readable medium of Claim 94, wherein said defining a user-defined application mode further comprises:

defining an object class corresponding to said user-defined application mode; and

defining a first portion of methods included in said object class using functionality that is inherited from other classes.

96. (Previously Presented) The computer readable medium of Claim 95, further comprising:

overloading a second portion of methods to provide alternative functionality.

97. (Previously Presented) The computer readable medium of Claim 96, further comprising:

using overloading in connection with at least one method to disable functionality of said at least one method.

98. (Previously Presented) The computer readable medium of Claim 97, further comprising:

selecting a plurality of application modes associated with at least one of a plurality of systems, said user-defined application being one of said plurality of application modes selected; and

forming a combined set of partial differential equations using sets of partial differential equations associated with said plurality of application modes.

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99. (Previously Presented) The computer readable medium of Claim 92,  
further comprising:  
defining at least one user-defined application that is a subclass of an  
existing class associated with an application mode.

100. (Previously Presented) The computer readable medium of Claim 99,  
wherein said application mode associated with said existing class is user-defined.

101. (Previously Presented) The computer readable medium of Claim 99,  
wherein said application mode associated with said existing class is predefined.

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